DRAFT CONCEPTUAL SITE MODEL: YERINGTON MINE

June 13, 2002

Atlantic Richfield Company has developed this draft conceptual site model (CSM) for the Yerington Mine site to assist the Yerington Technical Work Group (YTWG) in discussions regarding site investigations to be performed per the Closure Scope of Work and associated Work Plans. Three figures are attached to this text description: a flow diagram that illustrates potential sources, transport mechanisms, exposure pathways and receptors; a schematic block diagram that depicts these site model components, and a map of surface mine units overlain on a 2001 aerial photograph of the site.

The purpose of the CSM is to illustrate and describe the basic understanding of potential sources and pathways based upon available site information. The CSM is not intended to provide details or quantification of these potential sources and pathways. More detailed information about potential sources and pathways will be presented in specific Work Plans for site closure. Results of site investigations outlined in the Closure Scope of Work will provide improved definition to the CSM presented below.

Potential Sources

Figure 1 is a flow diagram that illustrates three potential sources (past and/or present) of constituents of concern (COCs) that may present a risk to human health and the environment. These sources are also depicted in Figure 2, the schematic block diagram. All identified surface mine units, and related process areas, are shown in Figure 3. Identified sources include:

- Surface mine units, and process areas;
- Discharges of process water (directly into ponds and/or via infiltration to groundwater through the vadose zone); and
- The Yerington Pit Lake.

Surface Mine Units and Process Areas

Surface mine units, process areas, and related disturbed areas are shown in Figure 3. Surface-deposited materials include tailings, waste rock and leached ore piles (leached ore piles are constructed on relatively impermeable liners to manage process fluids). Process, storage and maintenance areas associated with milling and leaching are also identified as sources.

Discharges Of Process Water

Past discharges during mining operations of mine tailings (in slurry form) to lined and unlined impoundments and discharges of process waters to lined and unlined evaporation ponds may have sourced COCs to underlying soils, the vadose zone and to groundwater via infiltration.

Yerington Pit Lake

The Yerington Pit Lake is a surface water body that has resulted from the accumulation of groundwater inflows in the pit from alluvial and bedrock flow systems, and from surface water derived from the Walker River (diverted during the 1997 flood). Groundwater inflows refilling the pit since the cessation of mine dewatering operations have a distinctive geochemical signature, resulting from ambient conditions and the interaction of groundwater with exposed bedrock in the pit walls. Mixing of

groundwater types, evapoconcentration of dissolved constituents, and limnological processes in the pit lake result in evolving and complex pit lake water quality.

Potential Pathways

Potential pathways have been identified based on media, and include fugitive dust, soil, sediment, surface water and groundwater. These pathways may link the identified sources to the potential receptors. Release mechanisms of constituents of concern (COCs) from potential sources include wind and runoff erosion, percolation of dissolved constituents from historic process water ponds, and leaching by meteoric water of surface mine units and process areas.

Erosion

Fugitive dust and contained COCs may be released and transported to potential receptors by wind erosion and atmospheric dispersion as fugitive dust, which may accumulate in residential or non-residential areas. Wind and runoff erosion of surface mine units may also release COCs to soils, sediments and the Wabuska Drain.

Percolation

Percolation of historic process waters into the soil column, vadose zone and groundwater aquifers is a potential release mechanism that likely ceased when mine operations ended and/or when or such waters evaporated.

Leaching

Leaching of COCs from surface mine units into underlying soils, the vadose zone and groundwater aquifers are also identified as potential release mechanisms. Infiltration of meteoric water containing leached COCs provides a physical link between the release mechanism and the media pathways described below.

Transport Mechanisms

A number of transport mechanisms link COCs released from potential sources to potential receptors. For example, fine-grained materials eroded from surface mine units and process areas may be transported by wind erosion and atmospheric dispersion (as fugitive dust) to downwind areas where they may accumulate.

Other transport-related mechanisms or processes that may occur at the Yerington Mine Site are shown in Figures 1 and 2. These include geochemical mobilization and attenuation during the infiltration of process waters or meteoric waters through the soil column and the vadose zone. Sedimentation and/or chemical precipitation may link sediment and surface water pathways. Similarly, seepage of groundwater to the Wabuska Drain or recharge from surface mine units and/or the Wabuska Drain to groundwater may also occur.

Given the hydraulic nature of the pit lake to function as an evaporative sink, it is unlikely that groundwater may flow out of, and transport COCs from, the pit lake into the bedrock flow system. However, this is a potential transport mechanism (shown as a dashed line in Figure 1).

Potential Receptors and Exposure Routes

Potential receptors include humans (workers, visitors and residents) and ecological (terrestrial and aquatic biota). Exposure routes to ecological receptors include the ingestion of soils and surface water. Exposure routes to human receptors include:

- Ingestion of, or dermal contact with, COCs in soils and sediments;
- Inhalation of COCs in fugitive dust;
- Ingestion of COCs in groundwater; and
- Ingestion of, or dermal contact with, COCs in surface water.

Fugitive dust generated during operations, and since mining operations ended, may contain COCs that could be inhaled by downwind workers, visitors or residents. Primary wind directions are to the northeast in the area of the Yerington Mine Site.

Soils developed on, or eroded from, surface mine units or associated with process areas may be mechanically transported into surface water features or COCs may be leached into the underlying soil column, vadose zone and groundwater. Historically ponded process waters may have sourced COCs to groundwater aquifers by percolation. However, percolation ceased when mining operations ended and remaining water in the ponds evaporated. Remaining solids (i.e., precipitates) in the ponds may source COCs into the underlying soil column, vadose zone and groundwater via leaching by meteoric water (if sufficient head is available).

Existing surface units and inactive process areas may source COCs into the underlying soil column and vadose zone via unsaturated flow as a result of meteoric water flux through the units or areas. If moisture storage conditions in the surface units, underlying soils and vadose zone are exceeded as a result of direct precipitation or run-off, COCs may be leached into groundwater. Geochemical mobilization and attenuation processes will affect the ultimate loading of COCs to groundwater.

Groundwater flow in the area of the Yerington Mine Site occurs in the alluvium and underlying bedrock. Groundwater flow in the alluvium is generally to the north except where affected by recharge from the Walker River and irrigation activities (e.g., recharge associated with irrigated fields and return-flow conveyance features), and by the effects of the existing pumpback well system. Flow directions in the bedrock are not well known, but are likely affected by the Yerington Pit, which functions as an evaporative sink.

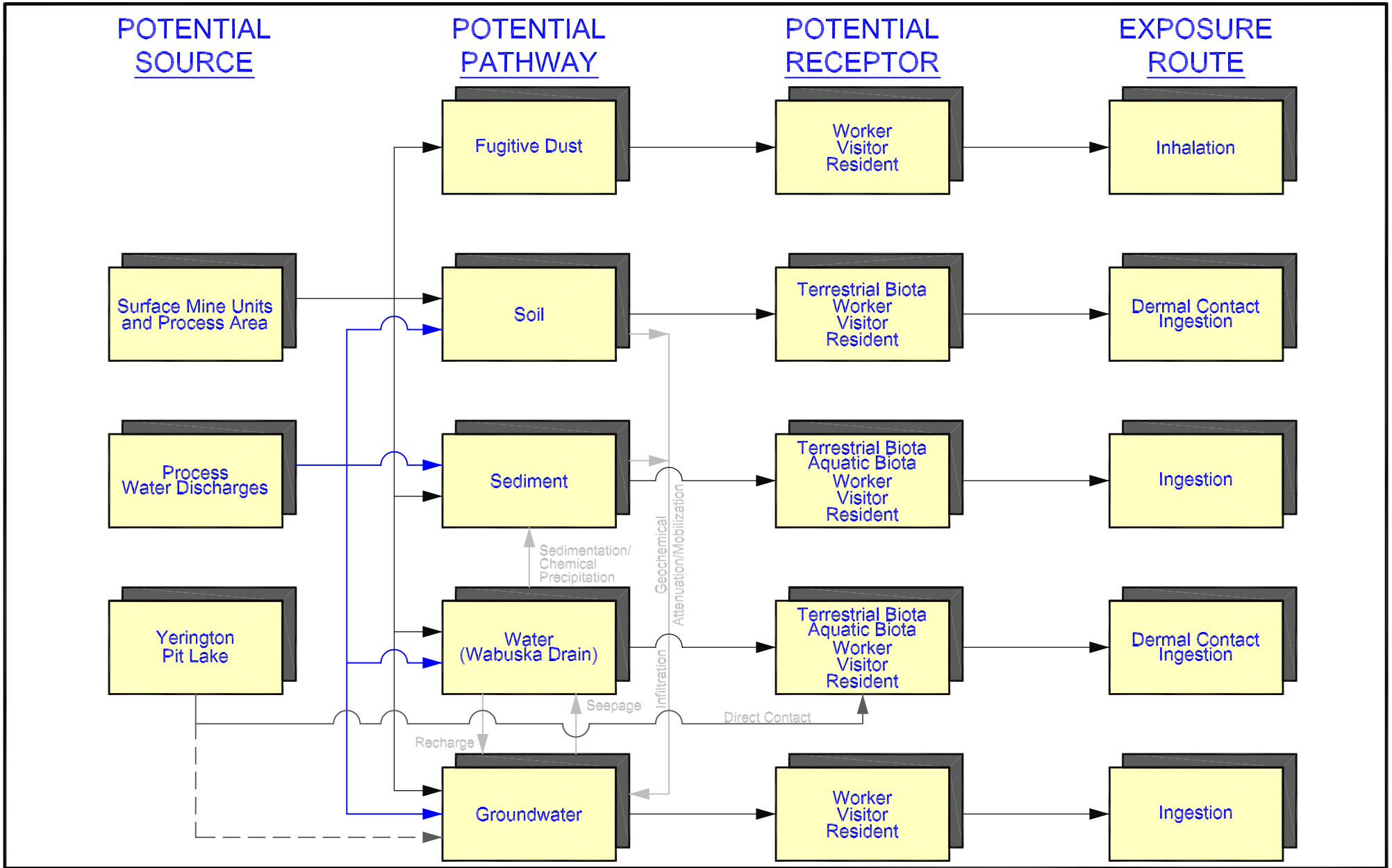

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Figure 1

Yerington Mine Site Conceptual Model Flow Diagram

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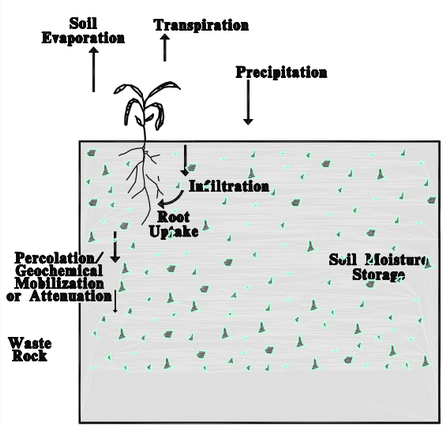
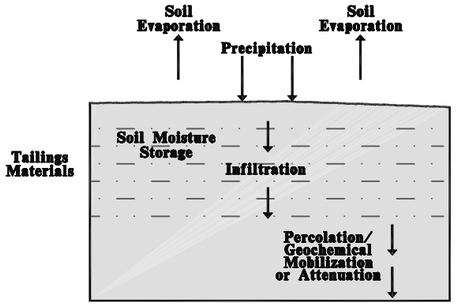
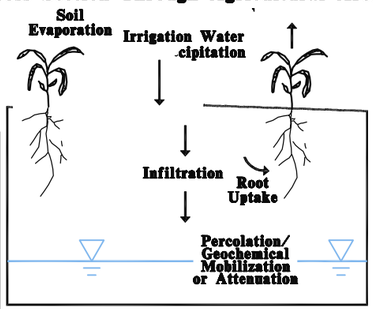
Cross Section Through Waste Rock Pile



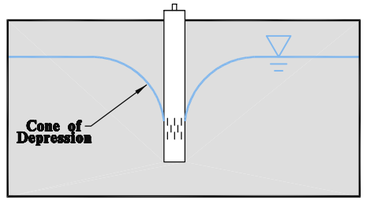
Cross Section Through Tailings Pile



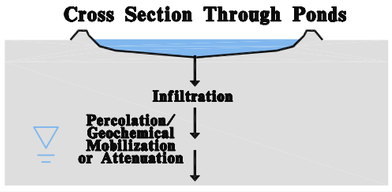
Cross Section Through Agricultural Area



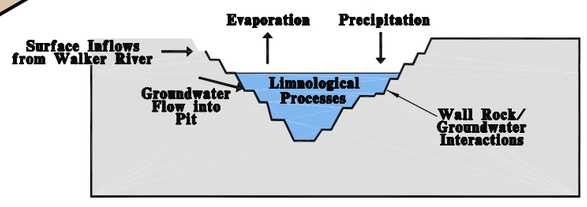
Cross Section of Pumpback and Domestic Well



Cross Section Through Ponds



Cross Section Through Pit Lake



Cross Section Through Arimetco Leach Pad

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Figure 2

Yerington Mine Site Conceptual Model: Schematic Block Diagram

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318000 320000 322000 324000 326000 328000 330000 332000

1552000 1550000 1548000 1546000 1544000 1542000 1540000

DISTURBED AREA
NORTH
MIDDLE
SOUTH
LINED EVAPORATION PONDS
PUMPBACK EVAPORATION POND
WEED HEIGHTS SEWAGE LAGOON
UNLINED FINGER EVAPORATION PONDS
A
B
C
D
E
UNLINED EVAP POND
VLT PLS PONDS
CLAY PIT
Arimetco Trash Dump
GEOTECH CLAY EXPLORATION PITS
VLT HEAP LEACH PAD
SULFIDE TAILINGS
DISTURBED AREA
WEED HEIGHTS DUMP
OXIDE TAILINGS
PHASE III HEAP LEACH PAD
VAT LEACH TANKS
PLANT SITE
DISTURBED AREA
MEGAPOND
PHASE II HEAP LEACH PAD
ARIMETCO RAFFINATE POND
WASTE ROCK AREA (NORTH)
PHASE I PLS POND
CRUSHER SITE
MINE SUBSTATION
ARIMETCO PLANT SITE
PLANT FEED PLS POND
SULFIDE DUMP TAILINGS
SIERRA PACIFIC SUBSTATION
MINE WATER TANKS
PHASE I HEAP LEACH PAD
SLOT HEAP LEACH PAD
SLOT PLS PONDS
DISTURBED AREA
DISTURBED AREA
PIT SAFETY BERM
YERINGTON PIT
PVT FUEL BULK PLANT
DISTURBED AREA
SIERRA PACIFIC ELECTRICAL DIST. YARD
DISTURBED AREA
YERINGTON PIT LAKE
WASTE ROCK AREA (SOUTH)

318000 320000 322000 324000 326000 328000 330000 332000

EXPLANATION

MINE UNIT

NOTES:
1.) PROJECTION: NEVADA STATE PLANE, WEST ZONE
1927 NORTH AMERICAN DATUM (FEET)

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SCALE:
700 0 700 1400 Feet
1:24000

N

FIGURE 3
MINE UNITS

YERINGTON, NEVADA